More Experimental Physics with Computers

I.   Objective

To develop a basic understanding of the software package LabVIEW.

II.   Introduction

Three weeks ago, we used a BASIC program to control an experiment. Today we will write simple programs using an application called LabVIEW designed specifically for interfacing a computer to a measuring device. LabVIEW will reserve variables and operations only for those parts of the program that need them, and offers an additional twist: programs are written with pictures instead of with words.

As we did then, we will write a program today that reads data from a (simulated) thermocouple and plots the data to the screen. The QuickBasic program we used previously to read a multimeter performed several tasks:

- Opening the multimeter for data transfer

- Rescaling the voltage by an appropriate amount for temperature conversion

- Looping to continue data taking until the key **Q** was typed

- Graphing data

The LabVIEW program we write today will also perform each of these tasks, but the approach to programming will be through pictures instead of commands.

III.   Exercises (from *LabVIEW Demonstration Book*)

A.   Module 2: Digital Thermometer VI

Objective:	to be introduced to LabVIEW and to create a virtual instrument that takes data from a thermocouple
Where to begin:	page 2-1 in the LabVIEW demonstration book
What to do:	perform the activities on pages 2-1 through 2-16
What to turn in to your instructor:	your log book and a printout of the block diagram
What to put in log book:	time your begin/end your work, new terminology

(1) Getting Started: To begin LabVIEW, double click the LabVIEW icon in Windows. Select the option **Explore LabVIEW**.   As you work through the exercises, note the definitions for the following terms:

- **Virtual Instrument (VI)**
- **Front Panel**
- **Block Diagram**
- **Icon/Connector**
- **Dataflow Programming**

B.   Module 3: Temperature Monitor VI

Objective:	to create a VI that monitors temperature readings collected by the VI created in Module 2
Where to begin:	page 3-1 in the LabVIEW demonstration book
What to do:	follow the instructions on pages 3-1 through 3-9
What to turn in to your instructor:	your log book, a copy of your block diagram
What to put in log book:	time you begin/end your work, problems encountered, solutions developed, interesting facts.

C.   Module 4: Temperature Analysis VI

Objective:	to modify the VI created in Module 3 to perform a three point average of the data
Where to begin:	page 4-1 in the LabVIEW demonstration book
What to do:	follow the instructions on pages 4-1 through 4-4
What to turn in to your instructor:	your log book, a copy of your block diagram
What to put in log book:	time you begin/end your work, problems encountered, solutions developed, interesting facts.

D.   Module 5: Temperature Control VI

Objective:	to modify the VI created in Module 4 to control the temperature of the experiment
Where to begin:	page 5-1 in the LabVIEW demonstration book
What to do:	follow the instructions on pages 5-1 through 5-5
What to turn in to your instructor:	your log book, a copy of your block diagram
What to put in log book:	time you begin/end your work, problems encountered, solutions developed, interesting facts.